

HEKTOEN (L.)



TWO INTERESTING MEDICO-LEGAL CASES.*

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I. *Instantaneous Death from the Entrance of Air into the Uterine Veins, during a Vaginal Douche in the Fourth Month of Pregnancy.*

The following case is added to the few that are found in medical literature illustrating sudden death, caused by the entrance of air into the veins through the recently and forcibly opened uterine sinuses.

J. D., a woman, aged 19, married for 7 weeks, and in excellent health and spirits, except occasional attacks of headache and vomiting since her marriage, went into her room, in apparent perfect health, for the alleged purpose of changing her dress; after being in the room about ten minutes, something was heard to drop and she seemed to be groaning. Her husband at once entered the room and found her lying on the floor with her head against the wall; beside her was a Davidson's syringe, a *pot de chambre* and a basin of cold water, all arranged in such a way as to suggest that she either had commenced or was about to take a vaginal douche. Her husband immediately placed her on the bed, and then he found that she was dead. All this took place in at the longest 10 to 12 minutes.

Examination twenty-four hours after death: Inspection showed the body to be well-formed and well-nourished, about 20 years of age, with no external marks of any kind; there was firm cadaveric rigidity; no signs of decomposition at all, but some lividity of the dependent parts of the body. There was no hymen; there were no tears or bruises about the vulva or perineum, and no blood or fluid of any kind in the vagina.

On opening the body all the great cavities were found empty and the serous membranes lining them smooth and shining. The uterus was enlarged, filling the true pelvis. The subperitoneal vessels of the small intestines contained short columns of blood, separated by clear, apparently empty spaces; pressure on the vessels would move their contents *in toto*, indicating that the apparently empty spaces contained some kind of gas. The same condition was found in the coronary vessels which contained even more gas. The heart *in situ* seemed about normal in size; the left ventricle was quite firmly con-

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presented by the author

tracted; palpation of the right ventricle which was distended gave the sensation of squeezing a rubber ball but partly filled with air. On incising the right ventricle which was done while the heart was still *in situ*, black, frothy blood oozed out in considerable quantity, many quite large bubbles of gas bursting on reaching the surface of the foaming mass; entangled in the columnæ carneæ of the wall of the ventricle were semi-solid clots, on incision of which cavities containing gas became apparent. In the right auricle was a much smaller quantity of blood, quite frothy from intimate admixture with air. The left ventricle and auricle were quite empty. The endocardium and the heart muscles showed no changes. The lungs were œdematous and congested. The uterus was globular in shape, about as large as a good sized cocoanut; its serous surface was reddish gray in color and quite smooth. It was opened along the middle of the posterior surface from the centre of the cervical os clear to the fundus; by so doing the placenta which was situated on the posterior wall was exactly bisected. The cervical canal was one and one-half inches long, and contained a mass of clear viscid mucus not mixed with blood. The cavity of the body of the uterus contained about two or three ounces of fluid blood, a fœtus without any membranes and the placenta. The fœtus was seven inches long, it weighed four ounces, and had a visible, rudimentary penis. The placenta was two and a half inches in diameter, situated on the posterior wall. At its inferior margin a commencing separation from the wall of the uterus had taken place to the extent of about three-quarters of an inch along the entire lower border. Beneath this separation were seen the openings of many uterine sinuses into which the end of a match could easily be passed. The wall of the uterus was one inch thick at the placental site, exclusive of course of the thickness of the placenta itself; elsewhere it was half an inch thick. In the left ovary was a *corpus luteum* of pregnancy. There were no gas bubbles found in the veins of the *ligamenta lata*, or in the vena cava or in the pulmonary arteries. The kidneys, liver, spleen, stomach and intestines were healthy. The brain and its membranes showed no macroscopical changes, the sinuses and veins containing perhaps more blood than usual.

The great accumulation of air in the right ventricle and auricle, the total absence of disease and decomposition in all the organs, the patulous uterine sinuses beneath the partial placental separation, made the diagnosis of death from air embolism evident, the air entering the uterine sinuses.

The fact that no air was found in the uterine sinuses themselves, in the venous plexuses around the uterus, or in the vena cava suggests

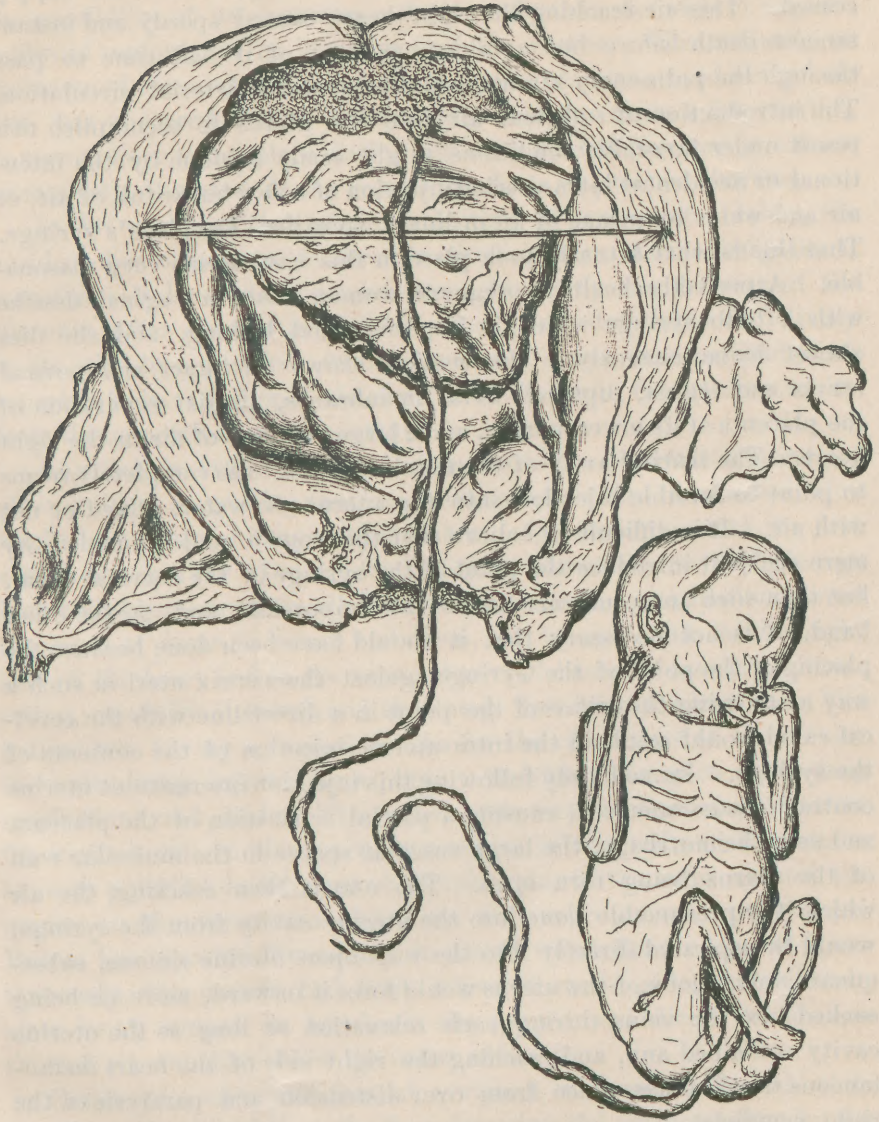


FIG. 1.

UTERUS OPENED SHOWING PLACENTA, *in situ*, WITH PARTIAL DETACHMENT
OF THE LATTER AT ITS LOWER MARGIN.

that all the air forming the embolus in the right heart entered the circulation *en masse*, and nearly or entirely at one time, *i. e.*, a certain quantity of air was introduced into the veins and then the supply ceased. This air reaching the right heart caused speedy and instantaneous death before but a minute portion of it had time to pass through the pulmonary circuit into the systemic arterial circulation. The introduction of sufficient air into the uterus to accomplish this result under favorable conditions might easily be done by the intentional or accidental intra-uterine injection of a few bulbs-full of air, or air and water by means of an ordinary so-called Davidson's syringe. That this is what actually took place in this case seems very reasonable. A perfectly healthy pregnant woman takes a vaginal douche with a bulb syringe which is imperfect and leaking, and she dies almost instantaneously. The section shows an intact and normal cervix and vagina, ruptured foetal membranes, partial separation of the placenta at its lower margin, and a large quantity of air in the right heart. The tearing away of the foetal membranes so completely seems to point to forcible injection into the uterus of water, mixed or not with air. It is difficult to believe that the woman could, unaided, by mere accident introduce the point of the syringe in the cervical canal, but then such an occurrence is not all impossible, and, on the other hand, it is not necessary that it should have been done because the placing of the point of the syringe against the cervix uteri in such a way as to bring the orifice of the point in a direct line with the cervical canal would result in the intra-uterine injection of the contents of the syringe. Immediately following this injection intermittent uterine contractions commenced, causing a partial separation of the placenta and some hæmorrhage, the large vascular spaces in the muscular wall of the uterus being torn open. The uterus then relaxing, the air which it is presumable came into the uterine cavity from the syringe, would be aspirated directly into the wide-open uterine sinuses, subsequent contractions of the uterus would force it onward, more air being sucked into the veins during each relaxation as long as the uterine cavity contained any, and reaching the right side of the heart instantaneous death takes place from over-distension and paralysis of the right ventricle.

Instances of death from the entrance of atmospheric air or gas into the circulation through the uterine veins, though of infrequent occurrence, have been observed sufficiently often so that obstetric writers now recognize air embolism as one of the causes of sudden death during or following labor.

As far as the literature at my disposal goes, there are as yet no

recorded observations of fatal air embolism, the point of entrance being the uterine veins, except during pregnancy, during labor or during the first few days of the puerperium, although Draper mentions the possibility of its occurrence during efforts to dislodge or explore a fibroid tumor growing in the wall of the uterus. The majority of instances of this variety, as regards the point of entrance, of air embolism, has occurred during or soon after labor; quite a few deaths, however, have taken place during the early part of pregnancy, almost exclusively, it seems, as the results of efforts to procure abortion.

In the cases that took place at the time of or soon after labor, the accident has sometimes followed vaginal or intra-uterine irrigations, sometimes it has occurred spontaneously during the delivery of the placenta, after changes in position, after precipitate labor or delivery in the standing posture; finally there are a few cases of embolism reported to have followed the formation of gas in the uterine cavity from decomposition of its contents.

Legallois in 1829 first called attention to the obstetric relations of air embolism, suggesting that the entrance of air into the uterine veins might be a cause of danger after labor. Cormack reported the first actual case in 1850 when he detailed three instances; in 1857 George May added three more, in all of which *post-mortem* examination proved the cause of death to be air embolism, air being found in the right side of the heart and in the vena cava. Olshausen's case is an interesting, carefully observed and absolutely demonstrated instance. His patient was having a vaginal douche for the effacement of the cervix, the water being injected by a pump. Suddenly she gave some deep inspirations and died. The *post-mortem* examination showed air in the right heart, in the coronary vessels, in the walls of the uterus beneath a partial detachment of the placenta, in the veins around the uterus, in the vena cava and there was subcutaneous emphysema. Braun, has reported three cases, in one of which the air entered spontaneously; the woman had been delivered on her side; immediately after being turned on her back she gasped and died; the section showed air embolism to be the cause of death.

Cordwint's case was that of a woman who was delivered while standing; the child fell on the floor dragging the placenta after it; the mother died instantly and at the autopsy air was found in the right heart, in the vena cava and in the walls of the uterus. In 1885 Laufs collaborated 43 cases of air or gas entering the uterine veins; in 17 the accident was caused by injections, in 18 it was spontaneous, and in 8 it followed the formation of gas in the uterine cavity; 39 of these

43 were fatal; in 31 *post-mortem* examination demonstrated air in the vessels and in the heart.

In 1859 Swinburne recorded a case of attempted abortion and death from the introduction of air into the veins; Greve, Litzman, Draper, Braun and others have reported similar cases. In one of Dr. Draper's cases the abortionist was convicted. Gunz's case is very much like the writer's case: A girl, 20 years old was found dead in her room, having between her legs an irrigator, the canula being in the vagina. She was three and one-half months pregnant and death was shown to have been caused by air embolism, the canula having entered the cervical canal.

The case I have reported and the brief references to the recorded similar catastrophes will emphasize the fact that while there is a surgical "danger zone" within the borders of which intra-venous insufflation of air is liable to occur because of the direct influence of respiration upon the circulation in the veins, yet on account of the marked vascular hyeplasia in pregnancy, on account of the great number of ways in which air may gain admission into the uterine cavity, both before, during and after labor, and on account of the intermittent contractions during the relaxations from which air may be aspirated into the open sinuses, the uterus forms an equally dangerous point of entrance for the air. Winckel says that in an examination during labor, in the removal of the placenta from the vagina, in the introduction of the hand into the uterus for the purpose of extracting the afterbirth, the admission of air is almost unavoidable.

Injections into the vagina or uterus with syringes from which the air has not first been expelled, or with syringes, of faulty construction, so that air is aspirated, may result in forcing air into the uterus. It also seems possible that air may get into the uterus after labor, during sudden changes of position, such as turning from one side on the back and *vice versa*. Senn says, in his valuable *Experimental and Clinical Study of Air Embolism*, which the student of this accident will always consult with great profit, that, if from any cause, air should reach the uterine cavity, it may be aspirated into the uterine sinuses by relaxation of the uterine contractions, and, having gained access into them, the air is readily forced into the circulation by subsequent contractions; the uterine walls acting the part of a suction and forcing pump. In view of this etiology it is evident that all exploratory, operative or therapeutic measures liable to admit air into the cavity of either the pregnant or the puerperal uterus, should be avoided as much as possible, or "hedged about with precautionary recognition of the danger."

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II. *Perforating Wound of the Uterus: Abortion: Peritonitis: Death.*

The following case is reported on account of the medico-legal point involved, namely, how long a perforating wound of the uterus could remain without healing, concerning which but little information is contained in the literature.

I am indebted to my friend, Dr. F. W. Rohr, of Chicago, for the clinical history.

I was called to see Mrs. C. on November 7th, 1890; she informed me that she was about $4\frac{1}{2}$ months advanced in pregnancy and that three weeks previously she had consulted a midwife and some sort of operation had been performed. A week later, no result having followed, she had again consulted the same midwife, who had performed a second operation. Some hæmorrhage occurred, but it was quite insignificant, and on November 4th she visited the midwife again. A third "operation" was made. During the first operation she had experienced severe pain. At my first visit she complained of bearing down pains and there was some hæmorrhage and other signs of an impending miscarriage. I declined to interfere, and left a prescription for an opiate. November 10th I was called again by the husband who said his wife was bleeding to death. I hastened to the patient and found, on examination, a $4\frac{1}{2}$ months fœtus in the vagina which I removed. The placenta being adherent I tamponed the vagina and in 12 hours removed both tampon and placenta, following this with an intra-uterine douche of bichloride solution. November 11th; the next day, the patient had some fever and abdominal tenderness. She grew worse daily and died from peritonitis on November 21st, ten days after the miscarriage. From my knowledge of the case I think the perforation was made at the *seance* of November 4th, or 17 days prior to death.

Section twenty-four hours after death. There were present Drs. Rohr, Harris and other physicians.

The cadaver was small and slender, with no marks of violence externally. The peritoneal cavity contained much yellowish, turbid fluid and the entire peritoneum was covered with a yellow, fibrinous membrane. In the pelvis the fluid was pure yellow, like pus. The omentum was thickened and adherent to the fundus of the uterus. The uterus measured $5 \times 3\frac{1}{2} \times 1\frac{1}{2}$ inches; the cervix uteri was red and the os patulous admitting easily the index finger, there being a triangular cervical laceration. The mucous membrane of the uterus was covered with a reddish semi-fluid material; there were no placental shreds, but a rough area, two inches in diameter over the anterior and right lateral aspect of the cavity of the womb. On the posterior wall of the uterus, just above the commencement of the cervical mucous membrane was a small slit-like opening, through which a wooden match passed easily upward and backward, emerging on the posterior surface of the uterus, one inch above the internal opening. Both the openings had ragged margins and around the posterior one was a distinct area of deep red color. The serous surface of the uterus partook of the general peritonitis; as already mentioned, the exudate was distinctly purulent in the excavations anterior and posterior to the uterus, particularly in the posterior *cul de sac* around the wound in the wall of the uterus. In the right ovary was a *corpus luteum*. The left ovary was as large as a walnut, soft and cedematous, presenting a reddish cut surface. The tubes were of normal thickness and contained no pus. The heart was normal, the lungs cedematous, the spleen soft and red, the liver light yellow in color, soft and opaque; the kidneys were yellow in color on the cut surface, normal in size. The brain and its membranes were normal.

As would be expected from the clinical history, there was here an enlarged uterus, apparently recently emptied of the products of conception, and a general fibrino-purulent peritonitis with such changes in the parenchymatous organs as are characteristic of fatal acute infective diseases. The purulent infection of the peritoneum may have taken place either through the Falloppian tubes or through the perforation in the wall of the uterus. In favor of the latter route speaks the absence of pyo-salpinx, the marked purulent character of the peritonitis in the vicinity of the abdominal end of the perforation and the direct communication which the perforation established between the uterine cavity and the peritoneum through which microbes might travel, in case the infection did not take place at the time the wound was inflicted. The question naturally suggests itself how long before

death could this perforation have existed. This question is of much medico-legal interest in this case because there is no evidence to show that the dead woman called on the midwife, now under indictment, any later than about seventeen days before her death, consequently if it be concluded that the wound could not have existed that long without healing, the evidence against the midwife loses much force. I have asked many physicians the question how long such a perforation might exist before healing, and the answer has been from forty-eight hours to three weeks. It seems to me, however, that the time required for such a wound to heal would depend principally and primarily upon the con-

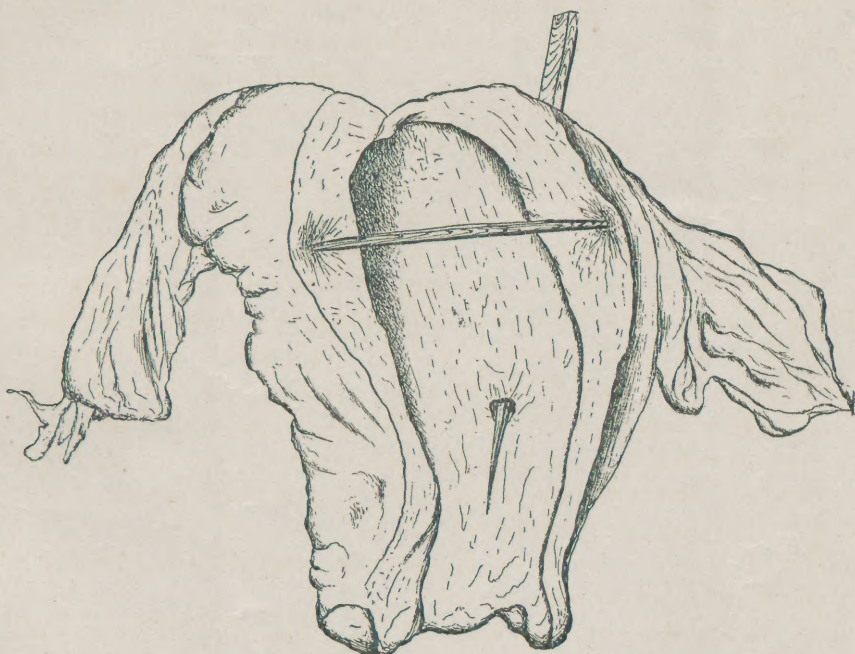


FIG 2.—UTERUS OPENED WITH STYLET PASSED THROUGH PERFORATION.

dition in the wound itself. If it remained aseptic, was made with an aseptic instrument and did not soon after become infected, such a wound ought to heal in a very short time, say forty-eight hours. On the other hand, if suppuration in the wound of the uterus, like suppuration in any other wound, might suspend the healing indefinitely, because the granulation cells would become transformed into pus corpuscles as soon as formed, I can consequently see no reason why the wound in this particular case might not have existed for seventeen days or longer, because it probably became infected at or soon after its infliction.

